

Threatened Species Assessment

Engaeus australis Lilly Pilly Burrowing Crayfish

Taxonomy

Engaeus australis Riek, 1969

Current conservation status

Categorised as Vulnerable in the 2009 Advisory list of threatened invertebrate fauna in Victoria (DSE 2009).

Proposed conservation status

Critically Endangered in Australia

Criterion B1ab(i,ii,iii,v)

Species Information

Description and Life History

The Lilly Pilly Burrowing Crayfish is a small terrestrial burrowing crayfish belonging to the southern hemisphere crayfish family Parastacidae. The maximum reported carapace length of the Lilly Pilly Burrowing Crayfish is 26.8 mm, and it has a short rostrum and a spineless, broadly tapering, caudally rounded telson (Horwitz 1990).

The taxon has poor dispersal, slow maturation and confinement to discontinuous habitats are common to short-range endemics (Harvey 2002) including the Lilly Pilly Burrowing Crayfish. Burrowing crayfish spend most of their time underground and freshly excavated soil at burrow entrances is the most obvious sign of their presence. Surface activity is suspected to be nocturnal (Richardson and Swain 1980) and is linked to dispersal and foraging and breeding (Van Praagh and Hinkley 1999). The diet of burrowing crayfish is predominantly plant-based and consists of roots, decomposing leaves and occasionally, small invertebrates (Lake and Newcombe 1975, Suter and Richardson 1977, Grown and Richardson 1988). The diet of the Lilly Pilly Burrowing Crayfish is not specifically known but is suspected to be similar. Activity is commonly related to seasonal rainfall (Morey and Hollis 1997, Van Praagh and Hinkley 1999). The cryptic behaviour of burrowing crayfish means little is known about their life history and ecology.

Breeding in most burrowing crayfish is likely to occur over spring and summer. Males surface during late spring and early summer to search for mates and then enter the burrows of females (Van Praagh and Hinkley 1999). Females incubate egg clusters under the abdomen and the juveniles hatch in late summer (Van Praagh and Hinkley 1999). Of 26 adults collected at Lilly Pilly Gully in early October 1982, only 3 were fully functional females; two of which were found in burrows with males and were gravid; the eggs being large, ovoid and undeveloped suggesting recent fertilisation (Horwitz 1990). There is a high frequency of intersexed specimens however the frequency of fully reproductive females is low (Horwitz 1990).

Generation Length

The generation length of the Lilly Pilly Burrowing Crayfish is inferred to be 3 to 5 years. Life history and larval development studies on two Tasmanian taxa (*E. cisternarius* and *E. fossor*) suggest the life span may be 3 to 4 years for these species (Suter 1977b). The suggested generation length has been used for *E. australis* as it is present over a greater area than the Tasmanian taxa.

Engaeus australis

Lilly Pilly Burrowing Crayfish

Distribution

The 35 known species of the genus *Engaeus* are endemic to south-east Australia, with most occurring in Victoria and Tasmania (Horwitz 1994). The majority of *Engaeus* species have small natural distributions so are also known as short-range endemics (Horwitz 1994). The Lilly Pilly Burrowing Crayfish is a short-range endemic due to its restricted distribution on Wilsons Promontory in southern Victoria, Australia.

The type locality for the species is Lilly Pilly Gully where the taxon has been regularly collected since 1928 (Horwitz 1990). The taxon has also been recorded from Sealers Cove in the south east and several southern locations including south of Mt Oberon and Growler Creek. Occurrences in the northern section include around Chinamans Creek and in the Vereker Creek area.

Habitat

The type locality for the species is Lilly Pilly Gully which is a slow, 2-3 m wide, meandering creek travelling through the floodplain which has many shallow but extensive pools (Horwitz 1990). The floodplain in this area consists of silts and loams with a very high organic content due to the rotting logs and leaves from the surrounding warm temperate rainforest (Horwitz 1990). Warm temperate rainforest is characterised by broad-leafed Lilly Pilly (*Syzygium smithii*) as the tree dominant and is found in eastern Victoria along steep creek lines at lower altitudes, with lower rainfall and higher temperatures than cool temperate rainforest. Three other burrowing crayfish species also occur on the floodplain: *E. cunicularius*; *E. quadrimanus* and *E. karnanga* (Horwitz 1990).

Threats

The taxon's life history, population dynamics and ecological requirements are poorly known, although it is thought that alteration in drainage patterns, water table levels and removal of riparian vegetation may adversely affect the species. Yen and Butcher (1997) noted that clearing of native riparian vegetation affects the hydrology of a catchment and can lead to soil erosion, salinisation and increased sedimentation within streams.

IUCN Criteria

Criterion A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]</p> <p>A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.</p>	<p>based on any of the following:</p>	<p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>
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Evidence:

Ineligible under Criterion A

The past and future population reductions do not meet the threshold for eligibility under criteria A2, A3 or A4.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy)			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 56 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

Each subpopulation may be variably affected by flood, with associated gravel slugs and black water, and even a wildfire, therefore there can be considered to be between one and five locations.

It is estimated to have a continuing decline in (i), (ii), (iii) and (v) above.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 28 km², based on based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is estimated to have one to five locations and a continuing decline in (i), (ii), (iii) and (v) above.

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Criterion C. Small Population size and decline		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b)	Extreme fluctuations in the number of mature individuals			

Evidence:

Ineligible under Criterion C as Data Deficient

There are no reliable estimates for the number of mature individuals due to the cryptic (i.e. underground) nature of the taxon.

Criterion D. Very small or restricted populations		Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)		< 50	< 250	< 1,000
D2. Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.		-	-	D2. Typically: AoO < 20 km ² or number of locations ≤ 5

Evidence:

Eligible under criterion D2 as Vulnerable

The taxon is estimated to be very restricted.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

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